**To:** Pressman, Jonathan[Pressman.Jonathan@epa.gov]
**Cc:** Durno, Mark[durno.mark@epa.gov]
**From:** Scott Smith
**Sent:** Mon 4/10/2017 2:05:45 PM
**Subject:** Follow Up Information

Jonathan,

As Mark forwarded your feedback on this NLP System, below is some additional clarification information I requested.

Also, I am working with the United Association of Plumbers & Pipefitters on a 10 city pilot water testing program – which includes cooling towers and buildings and testing for legionella and a wide spectrum of bacteria.

If possible, would like your feedback on the additional information below and then to set up a conference call at some point to discuss further.

Thanks.

**Best Regards,**

**Scott C. Smith**
**Cell (508) 345-6520**
**Twitter: @WaterWarriorOne**

**From:** Teresa Johns <tjohns@nlpaquasolutions.com>
**Date:** Friday, April 7, 2017 at 2:43 PM
**To:** Scott Smith <ssmith@opflexinventor.com>
**Cc:** Troy Rackley <troy@nlpaquasolutions.com>
**Subject:** Re: Feedback from EPA on NLP System - Please Advise

Hi Scott,
Here is a high level summary of some key points regarding the Catalytic Water Optimizer technology and results. I've included portions of the slides from the presentation on our cooling tower system (NLP Aqua Cube) with additional commentary.

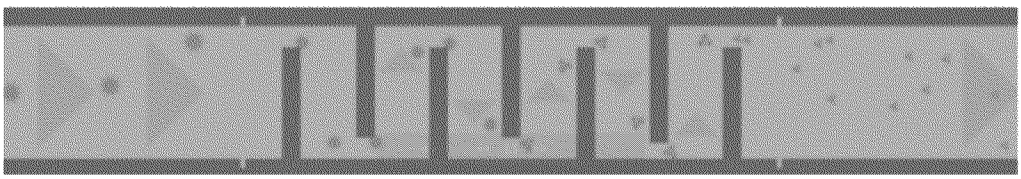
## Catalytic Water Optimizer

Contains proprietary **Alloy Core**

- Made of dissimilar metals from both the cathode and anode side of the galvanic scale
- Specially configured internally to create an indirect flow pathway
- Contains no moving parts or consumables (electricity)
- Requires specific flow range and pressure for optimal results

## Catalytic Water Optimizer : How does it work?

- Turbulent flow forces molecules to repeatedly come into contact with the metal alloy.
- A catalytic action occurs with the galvanic sites on the alloy that encourages cathode – anode reactions to take place.
- Electrons are released creating available nuclei that results in destabilized surface charges on suspended solids.
- The destabilized surface charge combined with the flow turbulence transforms the particles into nano-sized colloids.



Referring to the excerpts from the 2 slides above, there are multiple chemical and physical changes that take place as water passes through the Catalytic Water Optimizer (CWO). As the water passes through the unit, the indirect pathway creates turbulence with high and low pressure areas capable of producing cavitation. With the cathode and anode metals in the alloy and gas coming into contact with the molecules, this environment is similar to the conditions that are present in electrolysis. The zeta potential is lowered creating destabilized surface charges. The turbulence aids the process further by physically forcing the molecules to repeatedly contact and depart from the alloy surface. The combined actions of the cathode - anode reactions, cavitation, and turbulence work together to produce the nano-sized particles with a destabilized surface charge. A study has shown that after passing through the CWO, these particles are physically changed in crystalline structure and tend to coagulate together producing all the results listed in the following slide excerpt:

## What happens to water when optimized?

- Destabilized surface charges results in a 30% increase of ORP
- Surface tension is lower, equivalent to that of hot water
- Nano colloids are formed and remain in suspension to prevent any scale deposits (Over a period of time, existing scaling will be removed)
- Prevents and removes biofilm formation
- Eliminates bio-fouling
- Water solubility is increased significantly
- Increases efficacy of filtration components and extends filter life

In the presentation, there is information about the NanoChlor Generator. This information was provided solely as a recommended method for chemical treatment in cooling towers because of the benefits of on-demand generation of the sanitizer from salt, eliminating the need for handling and storing chemicals and operating at a lower cost than traditional sanitizer dosing systems.

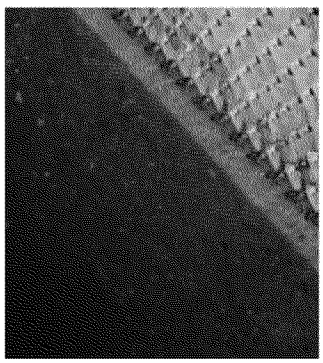
The slides following the NanoChlor information in the presentation provide results from two different actual installations of the CWO in cooling tower applications, one at the VA in Ann Arbor and the other at a beverage manufacturing facility. We will be revising the presentation for clarity because the results slides don't currently include the information of the differences in equipment before and after. In both of these installations, no changes were made to the chemical treatment systems. The only equipment installed was a recirculation loop of the cooling tower basin water through a Catalytic Water Optimizer with a ring main on the cooling tower basin return line. Therefore, these results were achieved with just recirculating the basin water through the CWO technology. Also, note that one of the results listed is that chemical usage was actually reduced after the CWO installation.

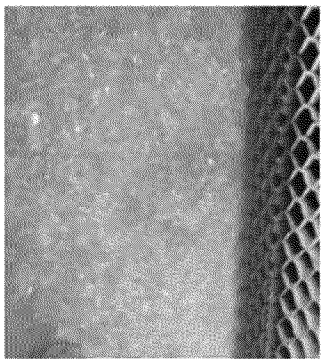
These results are from the VA in Ann Arbor:

## Results

1. 26% increase in ORP (374mV prior to 474mV)
2. Reduced chemical usage
3. Reduced labor costs both in duration & frequency of cleaning
4. Increased scale appeared in the back flush filters
5. In less than 24 hours, the cooling system self-corrected and the discoloration was removed via the NLP closed loop system
6. Ring main sprayer bar maintained a cleaner floor in the tower area

Before & After
July 2016 : One Day

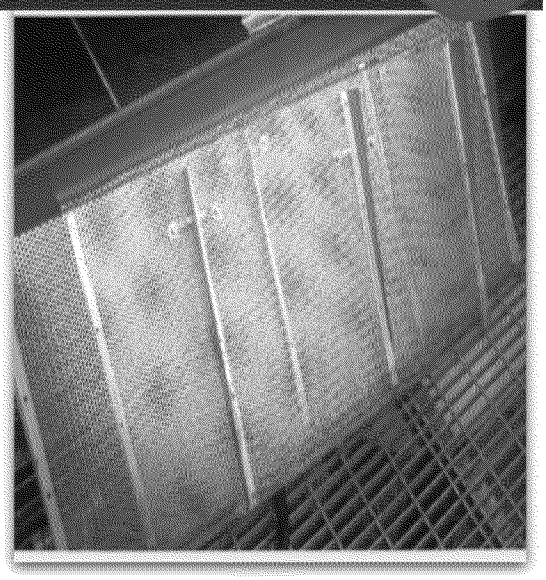




These results are from the beverage manufacturing plant:

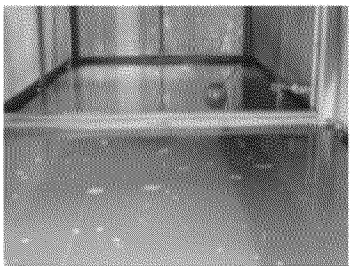
## Cooling Tower : Line A

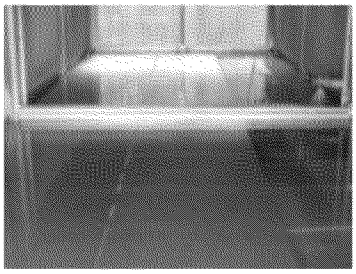
Before

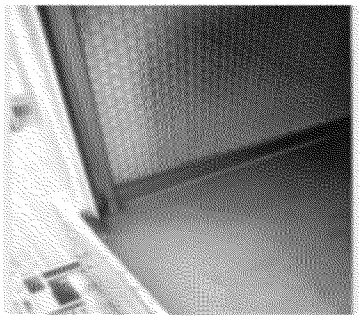


After

# Cooling Towers: Before & After







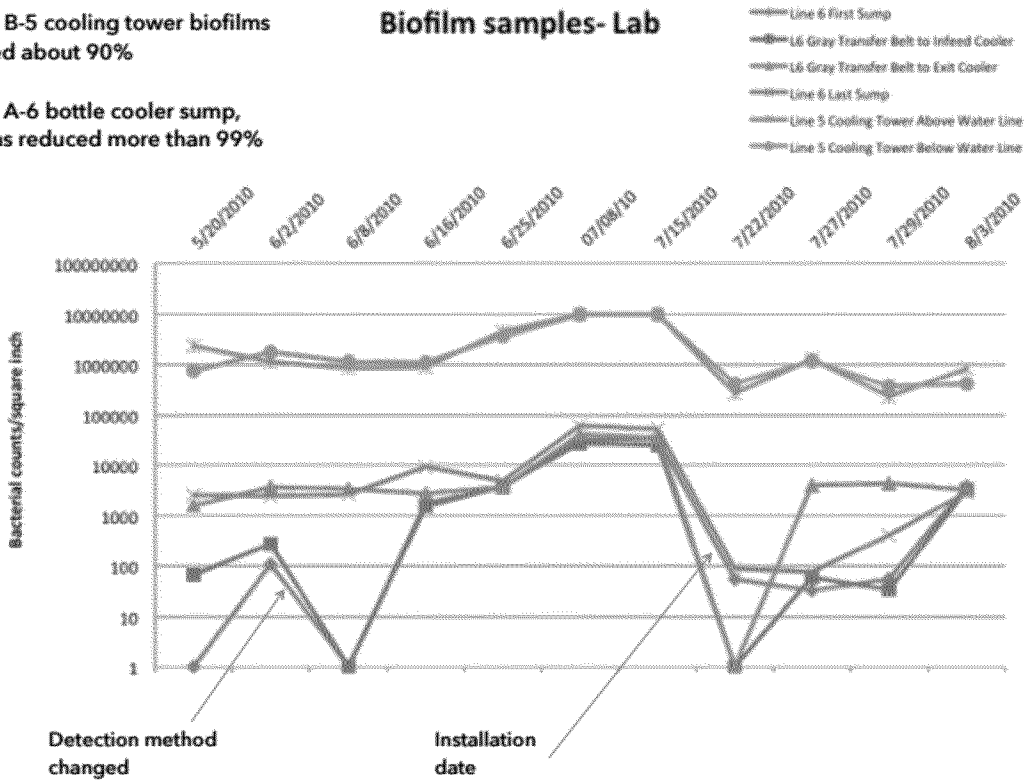
Before

After

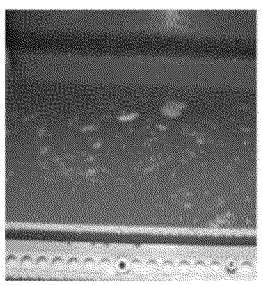
# Results

**In Line B-5 cooling tower biofilms reduced about 90%**

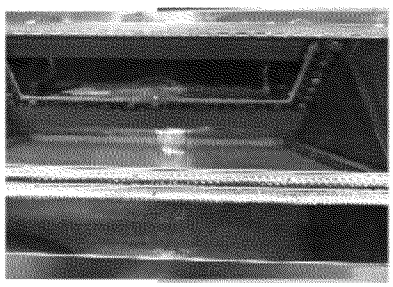
**In Line A-6 bottle cooler sump, biofilms reduced more than 99%**

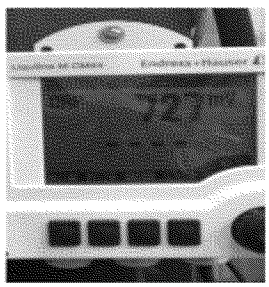



Here is an additional slide excerpt from a different presentation for the beverage manufacturing plant. After installing the CWO system, maintenance downtime to clean out the cooler was significantly reduced.



**Build up after 24 hrs of operation prior to NLP technology**





**The clarity of the water after three weeks of continuous operation. Bio-film free performance driven by increased ORP in excess of 700 mV that improved the solubility of the water.**

In addition to the proven results in cooling tower applications, we have statistically significant results in scale and biofilm reduction in dairies and other agricultural applications. Troy and I are available to further discuss and answer questions about the technology and proven results of Catalytic Water Optimizer.

Best Regards,
Teresa

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